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PHOTOMETRIC OBSERVATIONS OF 1 PERSEI

Radial velocity variations in 1 Per (HR 533, HD 11241, $m_v = 5.52$, Sp.T. B 1.5 V) have been suspected for 70 years. Estimates of the time scale of the variations have ranged from 15.6 days (Blaauw and van Albada, 1963) to "very short" (Beardsley, 1969). Light variations were first announced by Kurtz (1977). Kurtz suspected that 1 Per was an eclipsing binary, but he commented that the highest peak in the power spectrum of his observations was at a frequency of $3.01 \text{ cycles.day}^{-1}$, or a period of 0.33 day. Because of the proximity of 1 Per to the β Cep instability strip, and because of my interest in the β Cep and related stars (Percy, 1980), I obtained photometric observations of 1 Per in 1980 and 1981.

Subsequently, North et al. (1981) showed that 1 Per was an eclipsing binary with a period of 25.9359 days, and an eccentric orbit. Because the variations in 1 Per are now explained, and because I have found absolutely no evidence for intrinsic variations in 1 Per, I do not plan to observe this star further, and I am publishing my 1980 and 1981 observations at this time.

The observations were made at the Kitt Peak National Observatory (Tucson, Arizona, U.S.A.) in November 1980 and 1981, using the #4 0.4 m telescope, a pulse-counting photometer, and a Strömgren b filter. The comparison star was HR 540, which was found by Kurtz (1977) to be constant. The observations are listed in Table I and shown in Figure 1. The phase has been calculated from the ephemeris of North et al (1981), namely:

$$\text{HJD (short minimum)} = 2443562.853 + 25.9359 E$$

The following conclusions can be drawn from these observations.

1. There is no intrinsic variability outside of eclipse ($\Delta b < 0.^m01$).
2. The light curve appears to be flat ($\Delta b < 0.^m01$) from phase 0.25 to 0.40 and from 0.45 to 0.60.

Table I
Photometric Observations (Δb) of 1 Per--HR 540

HJD	ϕ	Δb	HJD	ϕ	Δb
2444000+			2444000+		
555.6764	0.280	-1.061	562.6653	0.549	-1.062
555.7243	0.282	-1.067	562.7708	0.553	-1.062
555.7944	0.284	-1.071	562.8729	0.557	-1.064
555.8917	0.288	-1.060	562.9313	0.560	-1.058
556.8590	0.325	-1.064	563.6736	0.588	-1.064
556.9354	0.328	-1.062	563.7375	0.591	-1.062
557.7813	0.361	-1.066	563.8472	0.595	-1.063
557.8861	0.365	-1.063	918.7280	0.278	-1.067
558.8271	0.401	-1.035	919.7083	0.316	-1.066
560.6632	0.472	-1.062	920.8326	0.359	-1.067
560.7431	0.475	-1.062	921.6840	0.392	-1.069
560.8576	0.480	-1.064	924.6889	0.508	-1.059
560.9604	0.484	-1.055	925.6715	0.546	-1.062

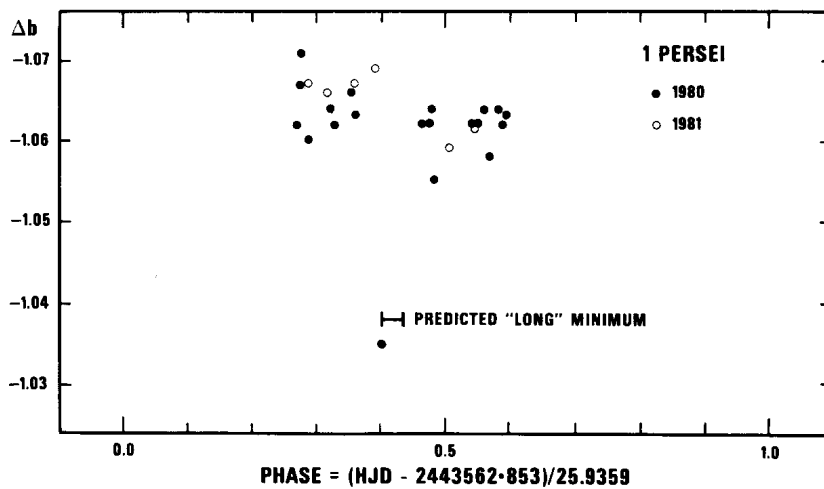


Figure 1: Photometric observations (Δb) of 1 Per relative to HR 540.

3. There is no significant change in brightness between 1980 and 1980 ($\Delta b < 0.01^m$).
4. Secondary minimum has begun by phase 0.401, and probably began at about phase 0.399. This information, when combined with Figure 3 of North et al (1981), suggests that the secondary minimum is symmetrical.

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